CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 2

DATE: **February 9, 2018**
FROM: **City of Grand Junction Purchasing Division**
TO: **All Offerors**
RE: **Las Colonias Business Park Phase I and Phase IA IFB-4476-18-DH**

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. **Pre-Bid Agenda and Attendance list attached.**
2. **Water Valve Box -** Valve boxes shall weigh a minimum of 90 lbs.
3. **Construction Timeline -** 56 calendar days have been added to the project.
4. **Water Quality Outlet Structure** – See attached detail.
5. **Geotechnical Report** – See attached.
6. **HP Storm Pipe** – Approved equal to Reinforced Concrete Pipe.

Q&A

7. **Discrepancy in Curb Height** – The bid schedule shall apply (14" Curb Height). If the Contractor chooses so, spill gutter may be placed in lieu of 6' x 14" curb.
8. **Steel Casing Fill Material** – Annular space within steel casing shall remain open. The installation of the carrier pipe shall include approved skids, bell restraints and end caps. The end caps may be concrete or approved industry standard boot. Refer to GU – 07 for detail.
9. **Are the triple box culverts intended to be cast in place, pre-cast or either?** May be either.
10. **If cast in place, is it correct we are to use M-601-3 for sizing, thickness and reinforcing of culvert lid, base and walls? If correct**: Correct
    a. **Confirm we are to use S-8, R-6 w/ <2' of fill since the table on above standard does not go any smaller.** Correct, use S-8, R-6.
    b. **The drawing indicates less than 2' of fill over culvert. Should only the rebar called out in note 5 be epoxy coated or should all rebar be epoxy coated?** For cast in place construction rebar shall be epoxy coated in accordance with CDOT M&S Standards, M-601-

3 Sheet 2 of 2 (Note 4). Pre-cast construction of box culverts shall be exempt of epoxy coated rebar per M&S Standards.

c. **Detail for head wall (Sheet 20) dimensions base of culvert as 8", if we are to use the table per "a" above, the base is called out as 10" thick. Please clarify.** Headwall shall be constructed per dimensions set forth in M-601-3. Yes, 10" base.

11. **The notes on headwall detail (Sheet 20) refer us to M-601-10 for design. This standard is for pipe headwalls, shouldn't this refer us to M-601-3 which details headwalls for box culverts?** Correct, refer to M-601-3.
12. **Please confirm all reinforcing (retaining wall) shall be epoxy coated per the bid schedule.** The retaining wall shall require epoxy coated reinforcement throughout.
13. **The details refer us to M-601-20 for a 4' ht. wall. The bid schedule (Item 54) states "wall design height" should we be using 6' high wall in lieu of 4'?** Correct, utilize 6' for design purposes.

***Revisions to Plan Set(s) and the bid schedule along with geotechnical clarification and the release of existing contour maps shall be included in Addendum No. 3.**

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

CITY OF Grand Junction COLORADO

PUBLIC WORKS & PLANNING

Pre-Bid Meeting Agenda

Date: February 8, 2018

Project: Las Colonias Business Park Phase I and IA Project

Location: City Hall Auditorium

Conducted by: Jerod Timothy, Project Manager

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1. **Introduction, attendance list.**

2. **Pre-Bid Meeting** – Attendance at this pre-bid meeting is mandatory for Contractor's submitting bids to become the general contractor.

3. **Project documents**
   a. City of Grand Junction Standard Contract Documents, July, 2010 Edition
   b. Project Bid Documents
   c. Project Plan Set
   d. CDOT Standard Specifications for Road and Bridge Construction, 2017 Edition.

   Plans and Bid Documents are available for review or download on the City's Public Works Engineering web page.

4. **Bid submittal procedures**
   a. Contractor's Bid Form
   b. Price Bid Schedule
   c. Attendance at bid opening is optional
   d. Accepting Electronic Responses Only submitted through the Rocky Mountain E-Purchasing System (RMEPS).

5. **Insurance and bonding requirements**
   a. 5% bid bond
   b. Performance and payment bonds (100%)
   c. Insurance in General Conditions

6. **Addenda**

Addendum No. 2 will be posted prior to the end of the Friday, February 9, 2018 and shall include the following:

- Pre-Bid meeting agenda and attendance list along with all notes and questions that are addressed during meeting.
    - Revised Plan Sets Phase I and IA to include sheet numbers, revised joint trench detail (Street and Property Side), removal of 6" irrigation conduit and location of the 6" C-900 recirculation line.
    - Approved Water Valve Box (90 lb. Minimum)
    - Revised Construction timeline (additional 56 calendar days).
    - SP – 8 shall be revised as follows:
        - Joint Trench (Street Side) – Delete 6" Sched. 80 Landscape Irr. Conduit and 6" C-900 Raw Water Irr. Conduit
        - Joint Trench (Property Side) – Add 6" C-900 Raw Water Irr. Conduit and 6" C-900 Pond Recirculation Conduit
    - Revised Bid Schedule to include the following:
        - Material quantities for pond bottom.
        - Adjusted quantities to 6" C-900 and 6" Sched. 40 Conduit.
        - Removal of the geotechnical testing line item.
    - Water Quality Outlet Structure Detail
    - Geotechnical Report
    - HP Storm Pipe approved equal for RCP.

It's the bidder's responsibility to make sure they have acknowledged all addendums issued for this project. The bidder can find addendums on the City of Grand Junction Engineering website.

7. **Project specific issues**

a. **Hours of Operations:** The hours of operations for this Project are as follows: Monday – Friday, 7:00 a.m. to 5:00 p.m.

b. **Project Start Date:** The project is scheduled begin on Monday, March 26, 2018

c. **Time of Completion:** The scheduled time of completion for the project has been extended to 152 Calendar days (August 24, 2018) from the starting date specified on the Notice to Proceed.

d. **Uranium Mill Tailings:** Radioactive mill tailings are not anticipated to be encountered on this Project but in accordance with deed restrictions and the history with the site the Contractor shall adhere to the Uranium Mill Tailings Management Plan supplied in Appendix B.

e. **Dewatering:** Ground water is expected to be encountered during excavation for deep utilities. When necessary to dewater the Contractor will be required to excavate a settlement pond adjacent to the trench to discharge to. The intent is to capture the water and allow to percolate. Within 30 days of construction of the pond(s) it shall be backfilled to comply with an exemption from the Authority of Solid Waste, Section 9, Temporary Discharge to Impoundment. The cost of said work shall be considered incidental to pipeline installation and will not be measure or paid for separately.

f. **Work by Others:**

   i) Xcel Energy and Charter will be providing and placing conduit and installing utilities in Joint Trench (Property Side). The trench is to be excavated by the Contractor per plans and specifications. Along with said work the Contractor will also be responsible for providing and installing conduit in the trench for Century Link. Coordination with Xcel, Charter and Century Link will be required by the Contractor. The Contractor will be responsible for bedding, haunching and backfill of the trench. See Special Provisions 8 (SP – 8) for more information.
   ii) The City Traffic Department will supply and install street/stop signs and double yellow striping.

g. Building Pad Sites - Embankment shall be placed in designated pad sites in the following order.
   i) Phase I - A, B, C.
   ii) Phase IA – Refer to sheets 43 - 46 in Plan Set.

h. **Incidental Items:** Any item of work not specifically identified or paid for directly, but which is necessary for the satisfactory completion of any paid items of work, will be considered incidental to those items, and will be included in the cost of those items.

i. **Certified Flatwork Finisher and Technician:** Hand finishing concrete will be permitted only when performed under the direct supervision of a craftsman holding the following certificate: ACI Concrete Flatwork Finisher and Technician (ACICFFT) or other Flatwork Finisher certification program approved by the Project Engineer/Manager.

The Contractor shall submit a current certificate at or before the preconstruction meeting.

8. **Las Colonias Amphitheater:**
Access to the east entrance of the Amphitheater main parking lot shall remain open during all events. This will require close coordination between the Contractor and Parks and Recreation. Find a list of scheduled events at www.gjcity.org/residents/parks-recreation/las-colonias-park-amphitheater/upcoming-events-list.

9. **Site Visit** - Suggested to all prospective bidders to visit the locations to see what obstacles they may encounter.

10. **Questions and answers**
See Addendum No. 2 for questions and answers.

Huddleston-Berry
Engineering & Testing, LLC

GEOTECHNICAL AND GEOLOGIC HAZARDS INVESTIGATION
LAS COLONIAS BUSINESS PARK
GRAND JUNCTION, COLORADO
PROJECT#00208-0077

CITY OF GRAND JUNCTION
333 WEST AVENUE, BUILDING E
GRAND JUNCTION, COLORADO 81501

JANUARY 26, 2018

Huddleston-Berry Engineering and Testing, LLC
640 White Avenue,
Grand Junction, Colorado 81501

TABLE OF CONTENTS

1.0 INTRODUCTION

As part of continued development in Western Colorado, the City of Grand Junction proposes to create the Las Colonias Business Park in Grand Junction. As part of the design development process, Huddleston-Berry Engineering and Testing, LLC (HBET) was retained by the City of Grand Junction to conduct a geologic hazards and geotechnical investigation at the site.

1.1 Scope

As discussed above, a geologic hazards and geotechnical investigation was conducted for the Las Colonias Business Park in Grand Junction, Colorado. The scope of the investigation included the following components:

- Conducting a subsurface investigation to evaluate the subsurface conditions at the site.
- Collecting soil samples and conducting laboratory testing to determine the engineering properties of the soils at the site.
- Providing preliminary recommendations for foundation types and subgrade preparation.
- Providing preliminary recommendations for bearing capacity.
- Providing recommendations for lateral earth pressure.
- Providing recommendations for drainage, grading, and general earthwork.
- Providing recommendations for pavements.
- Evaluating potential geologic hazards at the site.

The investigation and report were completed by a Colorado registered professional engineer in accordance with generally accepted geotechnical and geological engineering practices. This report has been prepared for the exclusive use of the City of Grand Junction.

1.2 Site Location and Description

The site is located east of the Las Colonias Amphitheater in Grand Junction, Colorado. The project location is shown on Figure 1 – Site Location Map.

At the time of the investigation, the site was generally open with a slight slope down to the south. A concrete path ran through the site. Vegetation consisted primarily of scattered weeds. Numerous piles of fill were present across the site. The site was bordered to the north by the Riverside Parkway and existing commercial properties, to the south by the Colorado River, to the west by the Riverside Parkway and the existing Las Colonias Amphitheater, and to the east by existing commercial property.

1.3 Proposed Construction

The proposed construction is anticipated to include grading several building pad sites, paved parking lots, and paved site roadways. A generalized site plan is included as Figure 2.

2.0 GEOLOGIC SETTING

2.1 Soils

Soils data was obtained from the USDA Natural Resource Conservation Service Web Soil Survey. The data indicates that the site is underlain by Massadona silty clay loam, 0 to 2 percent slopes. Soil survey data is included in Appendix A.

Structure construction in the Massadona soils is described as being somewhat limited due to shrink-swell. Road construction in the site soils is indicated to be very limited due to frost action, low strength, and/or shrink-swell. Excavation in the site soils is described as being somewhat limited due to dust, clay content, and/or unstable excavation walls. The site soils are indicated to have a high potential for frost action, high risk of corrosion of steel, and high risk of corrosion of concrete.

2.2 Geology

According to the *Geologic Map of the Grand Junction Quadrangle, Mesa County, Colorado* (2002), the site is underlain by alluvium, colluvium, and artificial fill.

2.3 Groundwater

Groundwater was encountered in the subsurface at depths of between 5.0 and 10.5 feet below the existing ground surface at the time of the investigation.

3.0 FIELD INVESTIGATION

3.1 Subsurface Investigation

The subsurface investigation was conducted on January 15th and 16th and consisted of nineteen borings. The borings were drilled to depths of between 8.0 and 16.0 feet. Boring locations are shown on Figure 2 – Site Plan. Typed boring logs are included in Appendix B. Samples of the native soils were collected during Standard Penetration Testing (SPT) and using bulk sampling methods at the locations shown on the logs.

As shown on the logs, the subsurface conditions were variable. The test pits in the southwestern and eastern portions of the site generally encountered sandy lean clay or lean clay with sand soils to depths of between 4.5 and 13.0 feet. The clay was underlain by dense to very dense sandy gravel and cobbles to the bottoms of most of the borings. However, in boring PL-6, shale bedrock was encountered at a depth of 15.0 feet. Groundwater was encountered in these borings at depths of between 5.0 and 9.0 feet at the time of the investigation.

The borings conducted in the northeastern portion of the site generally encountered fill materials and/or native sand and clay soils to depths of between 4.0 and 10.5 feet. Below the fill/sand/clay, medium dense to very dense sandy gravel and cobbles extended to the bottoms of the borings. Groundwater was encountered in these borings at depths of between 6.0 and 10.5 feet.

4.0 LABORATORY TESTING

Selected native soil samples collected from the borings were tested in the Huddleston-Berry Engineering and Testing LLC geotechnical laboratory for natural moisture content, grain size analysis, Atterberg limits, maximum dry density and optimum moisture (Proctor), California Bearing Ratio (CBR), and water soluble sulfates content. The laboratory testing results are included in Appendix C.

The laboratory testing results indicate that the native clay soils are moderately plastic. In addition, the CBR results indicate that the native clay soils are slightly expansive with up to approximately 1.6% expansion measured in the laboratory.

The native sand soils were indicated to be non-plastic. In general, based upon our experience with similar soils in the vicinity of the subject site, the native sand soils are anticipated to be slightly collapsible. Water soluble sulfates were detected in the site soils in a concentration of 0.2%.

5.0 GEOLOGIC INTERPRETATION

5.1 Geologic Hazards

The most significant geologic hazard identified on the site is the potential impacts to the site of flooding of the Colorado River. However, moisture sensitive soils were also encountered at the site. In addition, shallow groundwater was encountered in portions of the site.

5.2 Geologic Constraints

In general, the primary geologic constraint to construction at the site is the presence of moisture sensitive soils. However, shallow groundwater and associated soft soil conditions may also impact the construction.

5.3 Water Resources

No water supply wells were observed on the property. As discussed previously, the site lies adjacent to the Colorado River. In general, with proper design and construction, the development of the property is not anticipated to adversely impact surface water or groundwater.

5.4 Mineral Resources

Potential mineral resources in western Colorado generally include gravel, uranium ore, and commercial rock products such as flagstone. As discussed previously, gravels were encountered in the subsurface at the site. However, based upon the location of the site and surrounding land use, HBET does not believe that the gravels at the site represent an economically recoverable resource.

6.0 CONCLUSIONS

Based upon the available data sources, field investigation, and nature of the proposed construction, HBET does not believe that there are any geologic conditions which should preclude construction at this site. However, foundations, pavements, and earthwork may have to consider the impacts of moisture sensitive soils, potential flooding of the Colorado River, and/or shallow groundwater.

7.0 RECOMMENDATIONS

7.1 Foundations

As discussed previously, moisture sensitive soils were encountered at the site. However, based upon the nature of the proposed construction, shallow foundations such as spread footings and monolithic structural slabs are likely to be appropriate for lightly loaded commercial structures at the site. However, to provide a uniform subgrade and limit the potential for excessive differential movements, foundations should be constructed above 18 to 36-inches of structural fill depending upon the results of site-specific geotechnical investigations. Where heavily loaded structures are anticipated, deep foundations such as helical piles are appropriate. The foundation alternatives are discussed in the following sections.

Shallow Foundations

As discussed previously, the native clay soils were shown to be moderately plastic and slightly expansive. Therefore, the native clay soils are not suitable for reuse as structural fill. Imported structural fill should consist of a granular, non-expansive, non-free draining material such as crusher fines or CDOT Class 6 base course. Unless it can be demonstrated that they are not free-draining, pit-run materials should not be used as structural fill.

Prior to placement of structural fill, it is recommended that the bottoms of the foundation excavations be scarified to a depth of 9 to 12-inches, moisture conditioned, and compacted to a minimum of 95% of the standard Proctor maximum dry density, within ± 2% of the optimum moisture content, as determined in accordance with ASTM D698. However, depending upon the depth of excavation and time of year during construction, shallow groundwater and associated soft soil conditions may exist. It may be necessary to utilize geotextile and/or geogrid in conjunction with up to approximately 30-inches of granular fill to stabilize the subgrade.

Structural fill should extend laterally beyond the edges of the foundation a distance equal to the thickness of structural fill. Structural fill should be moisture conditioned, placed in maximum 8-inch loose lifts, and compacted to a minimum of 95% of the standard Proctor maximum dry density for fine grained soils and 90% of the modified Proctor maximum dry density for coarse grained soils, within ± 2% of the optimum moisture content as determined in accordance with ASTM D698 and D1557, respectively.

For the foundation building pads prepared as recommended with structural fill consisting of imported granular materials, a maximum allowable bearing capacity of 1,500 to 2,500 psf may be used depending upon the results of site-specific geotechnical investigations. In addition, a modulus of subgrade reaction of 250 pci may be used for structural fill consisting of crusher fines or base course. The bottoms of exterior foundations should extend a minimum of 24-inches below grade for frost protection.

Helical Piles

Helical piles consist of circular or square steel shafts with load carrying helices attached to them. Some of these types of piers are proprietary. In general, the precise type, size, and quantity of piles should be established by the contractor in conjunction with the structural engineer. However, HBET provides the following preliminary design comments.

In general, helical piles should be designed to penetrate the shallow soils and bear into the dense gravel and cobble soils. It is anticipated that the helical piles will reach refusal within 3 to 10 feet of the top of the gravel and cobble soils. Therefore, pile lengths of up to approximately 23 feet may be possible. However, a minimum pile length of 10 feet is recommended.

In general, for helical piles installed to refusal, the allowable structural capacity is used. Based upon our experience with other projects utilizing helical piles, allowable axial capacities of between approximately 20 and 40 tons are anticipated for helical piles, depending upon the shaft diameter. However, higher capacities are possible, if necessary. The actual allowable capacity should be determined based upon the results of load testing conducted on the individual project sites. To eliminate reductions in capacity from group effects, the piles should be spaced a distance equal to three times the diameter of the largest helix

7.2 Seismic Design Criteria

In general based upon the results of the subsurface investigation, the site classifies as Site Class D for a stiff soil profile.

7.3 Corrosion of Concrete

As indicated previously, water soluble sulfates were encountered in the site soils in a concentration of 0.2%. This concentration represents a severe degree of potential sulfate attack on concrete. The International Building Code (IBC) specifies Type V cement for this concentration of sulfates. However, Type V cement can be difficult to obtain in Western Colorado. Where Type V cement is unavailable, Type I-II sulfate resistant cement is recommended.

7.4 Non-Structural Floor Slabs and Exterior Flatwork

As mentioned above, expansive materials are present in the subsurface at the site. ***In general, slabs-on-grade cannot develop sufficient bearing pressures to resist swelling pressures. Therefore, some movement of slabs-on-grade should be expected.*** The only way to eliminate the potential for excessive differential movements would be to utilize structural slabs supported by deep foundations. However, structural slabs supported by deep foundations are likely cost prohibitive. In general, the risk of excessive differential movements can be reduced by constructing non-structural floor slabs above 18 to 24-inches of structural fill depending upon the results of site-specific geotechnical investigations. Exterior flatwork should be constructed above a minimum of 12-inches of structural fill.

Floating slabs-on-grade should not be tied in or connected to the foundations in any manner. If a non-structural floating floor slab is used, interior non-bearing partitions should include a slip-joint or framing void which permits a minimum of 2-inches of vertical movement.

7.5 Drainage

In order to improve the long-term performance of the foundations and slabs-on-grade, grading around the structures should be designed to carry precipitation and runoff away from the structures. It is recommended that the finished ground surface drop at least twelve inches within the first ten feet away from the structures. However, where impermeable surfaces (i.e. sidewalks, pavements, etc.) are adjacent to the structures, the grade can be reduced to approximately 2.5-inches (ADA grade) within the first ten feet away from the structures. Downspouts should empty beyond the backfill zone. It is recommended that landscaping within five feet of the structures include primarily desert plants with low water requirements. In addition, it is recommended that automatic irrigation within ten feet of foundations, including drip lines, be minimized.

7.6 Lateral Earth Pressures

Stemwalls and/or any retaining walls should be designed to resist lateral earth pressures. For backfill consisting of the native soils or imported granular, non-free draining, non-expansive material, we recommend that the walls be designed for an active equivalent fluid unit weight of 55 pcf in areas where no surcharge loads are present. An at-rest equivalent fluid unit weight of 75 pcf may be used. Lateral earth pressures should be increased as necessary to reflect any surcharge loading behind the walls.

7.7 Excavations

Excavations in the soils at the site may stand for short periods of time but should not be considered to be stable. The native soils generally classify as Type C soil with regard to OSHA's *Construction Standards for Excavations*. For Type C soils, the maximum allowable slope in temporary cuts is 1.5H:1V.

7.8 Pavements

The proposed construction is anticipated to include new parking lots and internal site roadways. As discussed previously, the pavement subgrade materials at the site range from clay soils to fill materials. The design California Bearing Ratio (CBR) of a composite sample of the site soils was determined in the laboratory to be less than 2.0. Therefore, the minimum recommended Resilient Modulus of 3,000 psi was used for the design.

Based upon the subgrade conditions and anticipated traffic loading, pavement section alternatives were developed in accordance with the *Guideline for the Design and Use of Asphalt Pavements for Colorado Roadways* by the Colorado Asphalt Pavement Association and CDOT *Pavement Design Manual*. The following pavement section alternatives are recommended:

Automobile Parking Areas (Limited Truck Traffic)
ESAL's = 100,000, Structural Number = 3.10

ALTERNATIVE	PAVEMENT SECTION (Inches)				
	Hot-Mix Asphalt Pavement	CDOT Class 6 Base Course	CDOT Class 3 Subbase Course	Concrete Pavement	TOTAL
A	3.0	13.0			16.0
B	4.0	10.0			14.0
C	3.0	6.0	10.0		19.0
Rigid Pavement		6.0		6.0	12.0

Mixed Use Areas (Higher Truck Traffic)
ESAL's = 350,000; Structural Number = 3.50

ALTERNATIVE	PAVEMENT SECTION (Inches)				
	Hot-Mix Asphalt Pavement	CDOT Class 6 Base Course	CDOT Class 3 Subbase Course	Concrete	TOTAL
A	4.0	14.0			18.0
B	5.0	11.0			16.0
C	4.0	6.0	11.0		21.0
Concrete Pavement		6.0		8.0	14.0

Internal Roadways
ESAL's = 500,000; Structural Number = 3.91

ALTERNATIVE	PAVEMENT SECTION (Inches)				
	Hot-Mix Asphalt Pavement	CDOT Class 6 Base Course	CDOT Class 3 Subbase Course	Concrete	TOTAL
A	4.0	16.0			20.0
B	5.0	13.0			18.0
C	4.0	6.0	14.0		24.0
Concrete Pavement		6.0		8.0	14.0

Prior to new pavement placement, areas to be paved should be stripped of all topsoil, fill, or other unsuitable materials. It is recommended that the subgrade soils be scarified to a depth of 12-inches; moisture conditioned, and recompacted to a minimum of 95% of the standard Proctor maximum dry density, within ±2% of optimum moisture content as determined by AASHTO T-99. However, as discussed previously, soft soils may be encountered associated with shallow groundwater. It may be necessary to utilize geotextile and/or geogrid in conjunction with up to approximately 30-inches of granular fill to stabilize the subgrade.

Aggregate base course and subbase course should be placed in maximum 9-inch loose lifts, moisture conditioned, and compacted to a minimum of 95% and 93% of the maximum dry density, respectively, at -2% to +3% of optimum moisture content as determined by AASHTO T-180. In addition to density testing, base course should be proofrolled to verify subgrade stability.

It is recommended that Hot-Mix Asphaltic (HMA) pavement conform to CDOT grading SX or S specifications and consist of an approved 75 gyration Superpave method mix design. HMA pavement should be compacted to between 92% and 96% of the maximum theoretical density. An end point stress of 50 psi should be used. It is recommended that rigid pavements consist of CDOT Class P concrete or alternative approved by the Engineer. In addition, pavements should conform to local specifications.

The long-term performance of the pavements is dependent on positive drainage away from the pavements. Ditches, culverts, and inlet structures in the vicinity of paved areas must be maintained to prevent ponding of water on the pavement

8.0 GENERAL

The recommendations included above are based upon the results of the subsurface investigation and on our local experience. These conclusions and recommendations are valid only for the proposed construction.

As discussed previously, the subsurface conditions encountered in the borings were variable. However, the precise nature and extent of subsurface variability may not become evident until construction. The recommendations contained herein are designed to reduce the risk and magnitude of differential movements and it is extremely critical that ***ALL*** of the recommendations herein be applied to the design and construction. However, HBET cannot predict long-term changes in subsurface moisture conditions and/or the precise magnitude or extent of any volume change in the native soils. ***Where significant increases in subsurface moisture occur due to poor grading, improper stormwater management, utility line failure, excess irrigation, or other cause, during or after construction, significant movements are possible***.

In addition, the success of the structure foundations, slabs, etc. is critically dependent upon proper construction. Therefore, HBET should be retained to provide materials testing, special inspections, and engineering oversight during ***ALL*** phases of the construction to ensure conformance with the recommendations herein.

Huddleston-Berry Engineering and Testing, LLC is pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

Michael A. Berry, P.E.
Vice President of Engineering

FIGURES

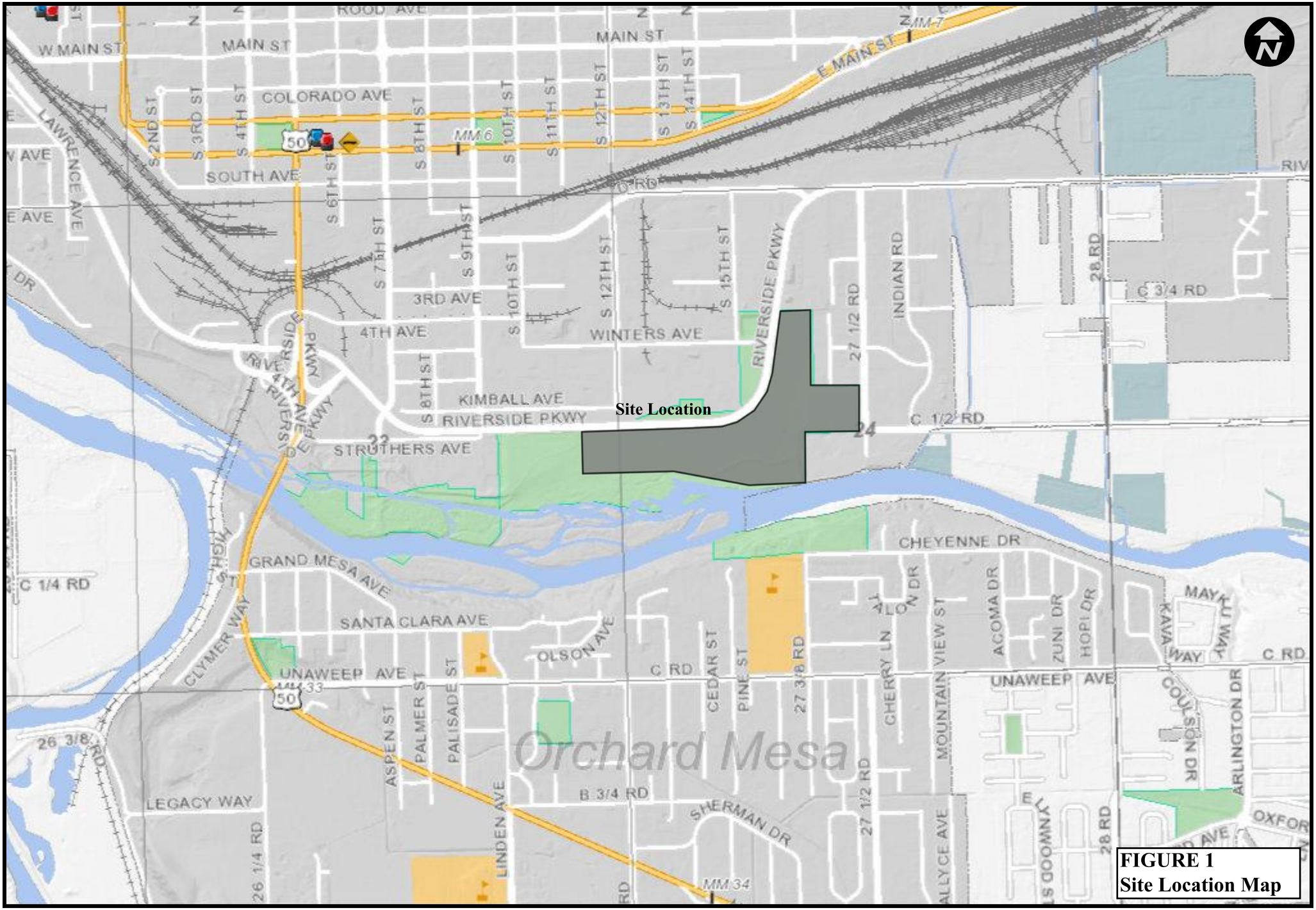

FIGURE 1
Site Location Map

Mesa County Map

0 0.125 0.25 0.5 mi
0 0.15 0.3 0.6 km

Print Date: January 26, 2018

Mesa County, Colorado
GIS/IT Department
gis.mesacounty.us

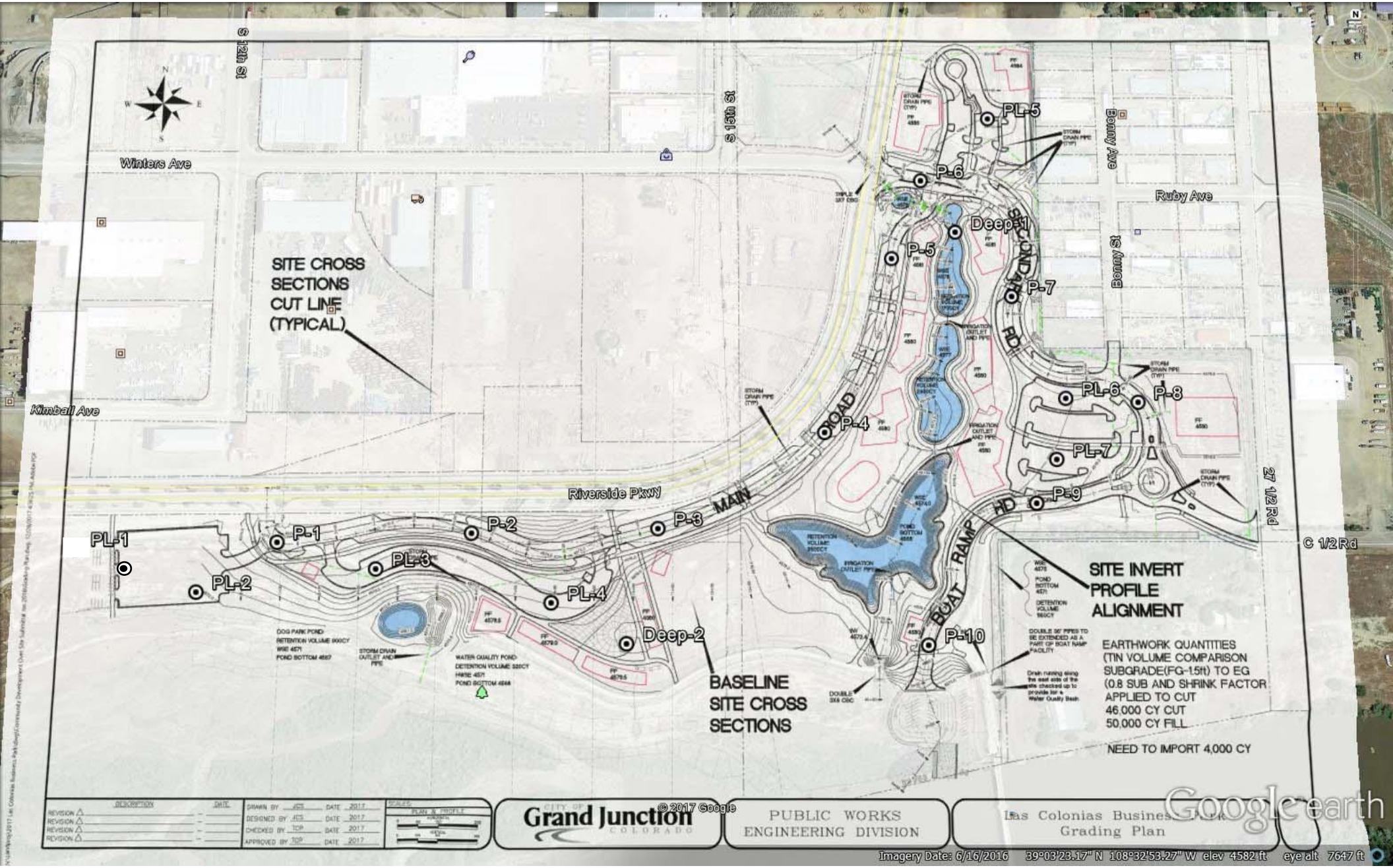

FIGURE 2
Site Plan

APPENDIX A
Soil Survey Data

Map Scale: 1:4,880 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 8, Oct 12, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Mar 2, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Massadona silty clay loam, 0 to 2 percent slopes — DRAFT	41.0	100.0%
Totals for Area of Interest		**41.0**	**100.0%**

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Mesa County Area, Colorado

Ba—Massadona silty clay loam, 0 to 2 percent slopes — DRAFT

Map Unit Setting

National map unit symbol: k06n

Elevation: 4,500 to 4,900 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Massadona and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Massadona

Setting

Landform: Fan remnants
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from clayey shale

Typical profile

A - 0 to 2 inches: silty clay loam
Bw - 2 to 12 inches: silty clay
Bky - 12 to 24 inches: silty clay
BCky1 - 24 to 48 inches: stratified silty clay loam to fine sandy loam
BCky2 - 48 to 60 inches: stratified silty clay loam to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Moderately saline to strongly saline (10.0 to 32.0 mmhos/cm)
Available water storage in profile: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Degater

Percent of map unit: 15 percent
Landform: Fan remnants
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Pariette

Percent of map unit: 15 percent
Landform: Fan remnants
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 8, Oct 12, 2017

Dwellings and Small Commercial Buildings

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect dwellings and small commercial buildings.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Dwellings and Small Commercial Buildings

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Dwellings and Small Commercial Buildings–Mesa County Area, Colorado							
Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ba—Massadona silty clay loam, 0 to 2 percent slopes — DRAFT							
Massadona	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.99	Shrink-swell	0.96	Shrink-swell	0.99

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 8, Oct 12, 2017

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Roads and Streets, Shallow Excavations, and Lawns and Landscaping

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Mesa County Area, Colorado							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ba—Massadona silty clay loam, 0 to 2 percent slopes — DRAFT							
Massadona	70	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.50	Frost action	1.00	Dusty	0.50
				Low strength	1.00	Too clayey	0.02
				Shrink-swell	0.99	Unstable excavation walls	0.01

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 8, Oct 12, 2017

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Report—Soil Features

Soil Features–Mesa County Area, Colorado									
Map symbol and soil name	**Restrictive Layer**				**Subsidence**		**Potential for frost action**	**Risk of corrosion**	
	Kind	**Depth to top**	**Thickness**	**Hardness**	**Initial**	**Total**		**Uncoated steel**	**Concrete**
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
		In	*In*		*In*	*In*			
Ba—Massadona silty clay loam, 0 to 2 percent slopes — DRAFT									
Massadona		—	—		0	—	High	High	High

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 8, Oct 12, 2017

APPENDIX B
Typed Boring Logs

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER P-1

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (cl), brown, moist, very stiff										
			SS 1	33	16-12-6 (18)							
2.5												
5.0		Sandy GRAVEl and COBBLES (gw), brown, moist to wet, very dense										
			SS 2	50	32-36							
7.5												
10.0			SS 3	75	19-37							
		Bottom of hole at 11.0 feet.										

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970-255-6818

BORING NUMBER P-2

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 6.5 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 6.5 ft
NOTES Auger Refusal at 7.5-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (cl), brown, moist, very stiff										
2.5			SS 1	89	8-8-7 (15)							
5.0												
7.5		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, very dense	SS 2	156	23-29-39/0"							
		Bottom of hole at 9.0 feet.										

GEOTECH BH COLUMNS 00208-0077 LAS COLONIAS.GPJ GINT US LAB.GDT 1/26/18

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Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER P-3

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 5.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 5.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (cl), brown, moist to wet, very stiff to medium stiff										
2.5			SS 1	78	21-6-11 (17)							
5.0												
7.5			SS 2	89	2-3-4 (7)							
10.0		Sandy GRAVEL and COBBLES (gw), brown, wet, dense	SS 3	72	16-21-28 (49)							
		Bottom of hole at 11.5 feet.										

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BORING NUMBER P-4

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (cl), brown, moist, medium stiff										
2.5			SS 1	72	3-5-3 (8)							
5.0												
7.5		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, very dense	SS 2	56	4-26-25 (51)							
10.0		Bottom of hole at 10.0 feet.										

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970-255-6818

BORING NUMBER P-5

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 6.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 6.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy GRAVEL and COBBLES (FILL), brown, moist, very dense										
2.5												
5.0		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, very dense										
7.5			SS 1	56	5-27-23 (50)							
10.0			SS 2	71	16-29-50/2"							
		Bottom of hole at 11.2 feet.										

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970-255-6818

BORING NUMBER P-6

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 7.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 7.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND (sm), br, moist, medium dense										
2.5			SS 1	78	8-9-9 (18)							
		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, medium dense to dense										
5.0												
7.5			SS 2	67	8-12-8 (20)							
10.0		Bottom of hole at 10.0 feet.										

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BORING NUMBER P-7

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION ---- **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 10.5 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 10.5 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel and trace Cobbles (FILL), brown, moist, hard										
2.5			SS 1	56	15-13-27 (40)							
5.0		Lean CLAY with Sand (cl), brown, moist to wet, very stiff										
7.5			SS 2	100	6-8-15 (23)							
10.0		Sandy GRAVEL and COBBLES (gw), brown, wet, very dense	SS 3	65	7-14-50/5"							
		Bottom of hole at 12.0 feet.										

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BORING NUMBER P-8

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION ---- **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 5.5 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 5.5 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Lean CLAY with Sand (CL), brown, moist, stiff										
2.5		*** Lab Classified SS1	SS 1	89	6-4-5 (9)			18	43	21	22	73
5.0		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, dense										
7.5												
10.0			SS 2	0	20-19-14 (33)							
		Bottom of hole at 11.5 feet.										

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BORING NUMBER P-9

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION ---- **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Lean CLAY with Sand and trace Gravel and Cobbles (cl), brown, moist to wet, stiff to hard										
2.5			SS 1	61	5-5-6 (11)							
5.0												
7.5			SS 2	44	4-39-14 (53)							
10.0		Sandy GRAVEL and COBBLES (gw), brown, wet, dense	SS 3	83	13-17-21 (38)							
		Bottom of hole at 11.5 feet.										

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BORING NUMBER P-10

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 6.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 6.0 ft
NOTES Auger Refusal at 7-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (cl), brown, moist, very stiff										
		*** Lab Cassified SS1										
2.5			SS 1	83	7-8-17 (25)			11	40	18	22	55
5.0		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, very dense										
7.5			SS 2	58	37-32							
		Bottom of hole at 8.0 feet.										

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BORING NUMBER PL-1

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION ---- **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 9.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 9.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Granular Base Course										
		Sandy GRAVEL (FILL), brown, moist, medium dense										
2.5		Sandy Lean CLAY (CL), brown, moist, very stiff *** Lab Classified SS1	SS 1	78	11-10-9 (19)			12	38	19	19	61
5.0												
		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, very dense										
7.5			SS 2	67	21-35							
10.0			SS 3	83	12-47							
		Bottom of hole at 11.0 feet.										

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BORING NUMBER PL-2

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 7.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 7.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY (cl), brown, moist, very stiff										
2.5		Sandy GRAVEL (gw), brown, moist, medium dense	SS 1	72	6-6-11 (17)							
5.0		Sandy Lean CLAY (cl), brown, moist to wet, very stiff										
7.5		Sandy GRAVEL and COBBLES (gw), brown, wet, very dense	SS 2	83	21-35							
10.0			SS 3	83	47							
		Bottom of hole at 10.5 feet.										

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BORING NUMBER PL-3

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING dry
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES Auger Refusal at 7-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (CL), brown, moist, very stiff										
2.5		*** Lab Classified SS1	SS 1	83	6-8-9 (17)			15	37	19	18	54
5.0		Sandy GRAVEL and COBBLES (gw), brown, moist, very dense										
7.5			SS 2	83	37-42							
		Bottom of hole at 8.0 feet.										

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BORING NUMBER PL-4

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING dry
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES Auger Refusal at 7.5-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY with Gravel (cl), brown, moist, very stiff										
2.5			SS 1	33	9-8-10 (18)							
5.0		Sandy GRAVEL and COBBLES (gw), brown, moist, very dense										
7.5			SS 2	58	21-50							
		Bottom of hole at 8.0 feet.										

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BORING NUMBER PL-5

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES Auger Refusal at 9-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy GRAVEL and COBBLES (FILL), brown, moist, very dense										
2.5												
5.0		Silty SAND (SM) brown, moist, medium dense *** Lab Classified SS1	SS 1	67	9-7-8 (15)			17	NP	NP	NP	50
7.5		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, very dense	SS 2	53	14-17-50/3"							
		Bottom of hole at 9.0 feet.										

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BORING NUMBER PL-6

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 9.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 9.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Lean CLAY with Sand (cl), brown, moist to wet, stiff to medium stiff										
			SS 1	33	3-4-5 (9)							
5												
			SS 2	61	2-2-2 (4)							
10												
			SS 3	89	3-5-18 (23)							
		Sandy GRAVEL and COBBLES (gw), brown, wet, dense										
15		SHALE, black, medium hard, highly weathered	SS 4	83	16-49							
		Bottom of hole at 16.0 feet.										

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BORING NUMBER PL-7

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Lean CLAY with Sand (cl), brown, moist, stiff										
2.5			SS 1	61	5-5-5 (10)							
5.0		Sandy Gravel (gw), brown, moist, dense										
		Lean CLAY with Sand (cl), brown, moist, stiff										
7.5		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, dense	SS 2	50	5-7-21 (28)							
10.0			SS 3	61	3-15-26 (41)							
		Bottom of hole at 11.5 feet.										

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BORING NUMBER Deep-1

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION _____ **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 7.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 7.0 ft
NOTES Auger Refusal at 9-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy GRAVEL and COBBLES (FILL), brown, moist, dense										
2.5		Sandy Lean CLAY with Gravel (cl), brown, moist to wet, very stiff	SS 1	0	6-10-13 (23)							
5.0												
7.5		Sandy GRAVEL and COBBLES (gw), brown, wet, very dense	SS 2	42	37-36							
		Bottom of hole at 9.0 feet.										

GEOTECH BH COLUMNS 00208-0077 LAS COLONIAS.GPJ GINT US LAB.GDT 1/26/18

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BORING NUMBER Deep-2

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO
DATE STARTED 1/15/18 **COMPLETED** 1/16/18
GROUND ELEVATION ---- **HOLE SIZE** 4-Inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY CM **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES Auger Refusal at 10-Ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Sandy Lean CLAY (CL), brown, moist, very stiff										
2.5		*** Lab Classified SS1	SS 1	67	7-7-8 (15)			14	41	20	21	59
5.0												
7.5		Sandy GRAVEL and COBBLES (gw), brown, moist to wet, dense to very dense	SS 2	50	10-11-27 (38)							
10.0			SS 3	83	51							
		Bottom of hole at 10.5 feet.										

APPENDIX C
Laboratory Testing Results

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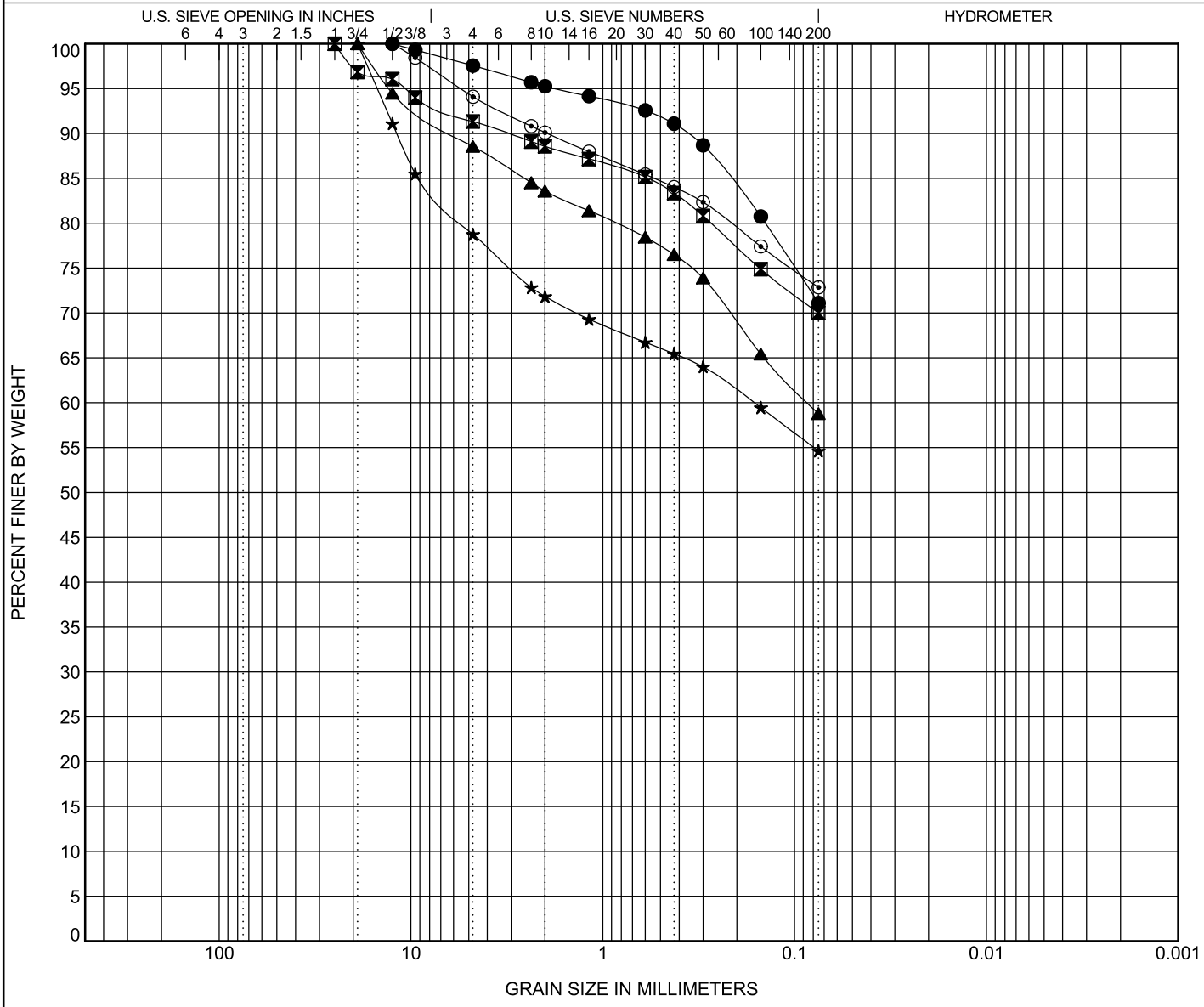
GRAIN SIZE DISTRIBUTION

CLIENT City of Grand Junction **PROJECT NAME** Las Colonias Business Park

PROJECT NUMBER 00208-0077 **PROJECT LOCATION** Grand Junction, CO



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● Composite 1 1/2018	LEAN CLAY with SAND(CL)	31	18	13		
⊠ Composite 2 1/2018	LEAN CLAY with SAND(CL)	37	17	20		
▲ Deep-2, SS1 1/2018	SANDY LEAN CLAY(CL)	41	20	21		
★ P-10, SS1 1/2018	SANDY LEAN CLAY with GRAVEL(CL)	40	18	22		
⊙ P-8, SS1 1/2018	LEAN CLAY with SAND(CL)	43	21	22		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● Composite 1 1/2018	12.5				2.4	26.5	71.1	
⊠ Composite 2 1/2018	25				8.7	21.3	70.0	
▲ Deep-2, SS1 1/2018	19	0.085			11.4	29.8	58.8	
★ P-10, SS1 1/2018	19	0.163			21.2	24.1	54.6	
⊙ P-8, SS1 1/2018	12.5				5.9	21.2	72.9	

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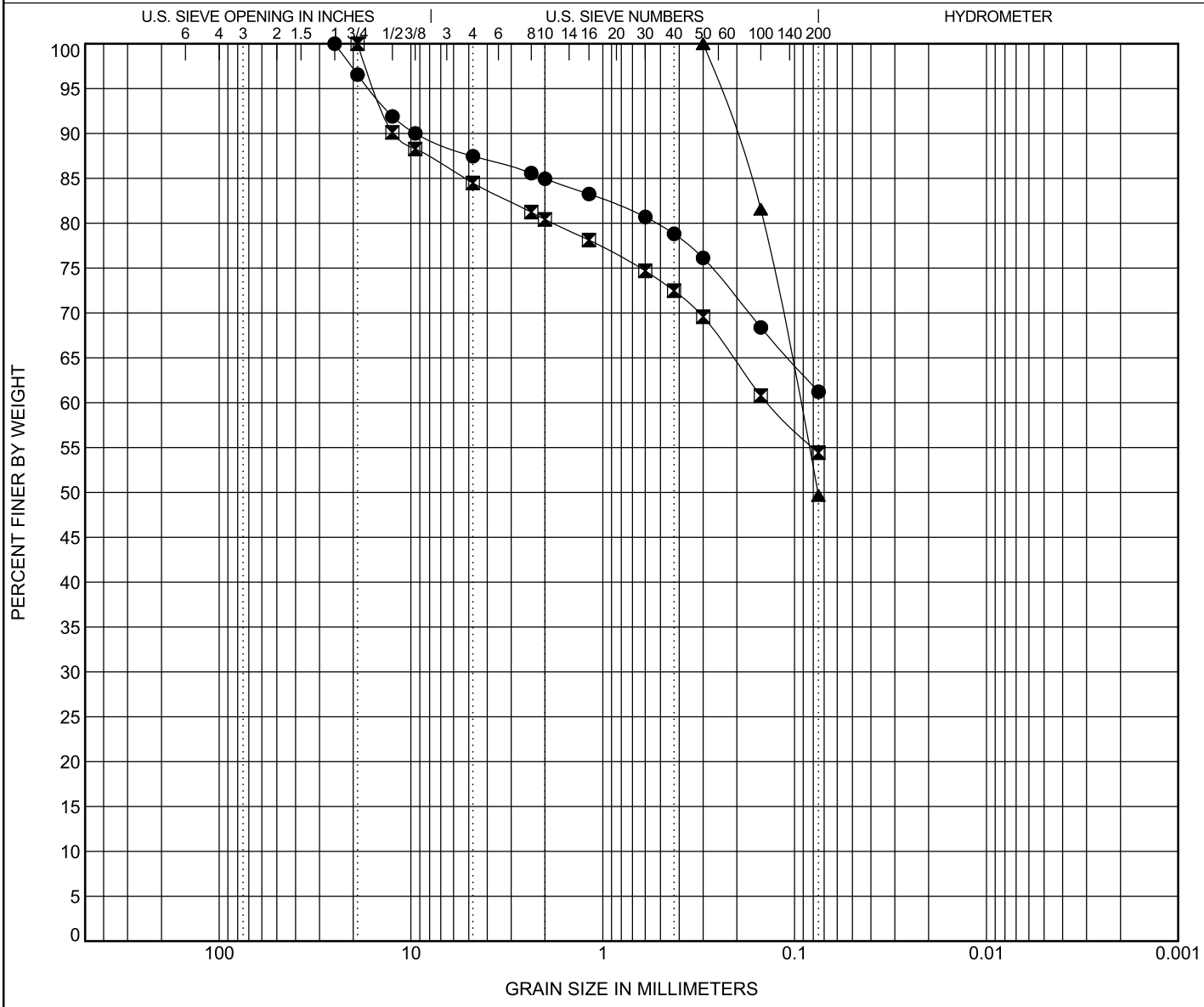
GRAIN SIZE DISTRIBUTION

CLIENT City of Grand Junction **PROJECT NAME** Las Colonias Business Park

PROJECT NUMBER 00208-0077 **PROJECT LOCATION** Grand Junction, CO



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	PL-1, SS1	1/2018	SANDY LEAN CLAY(CL)	38	19	19		
⊠	PL-3, SS1	1/2018	SANDY LEAN CLAY with GRAVEL(CL)	37	19	18		
▲	PL-5, SS1	1/2018	SILTY SAND(SM)	NP	NP	NP		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	PL-1, SS1	1/2018	25				12.5	26.2	61.2	
⊠	PL-3, SS1	1/2018	19	0.138			15.5	30.1	54.4	
▲	PL-5, SS1	1/2018	0.3	0.094			0.0	50.3	49.7	

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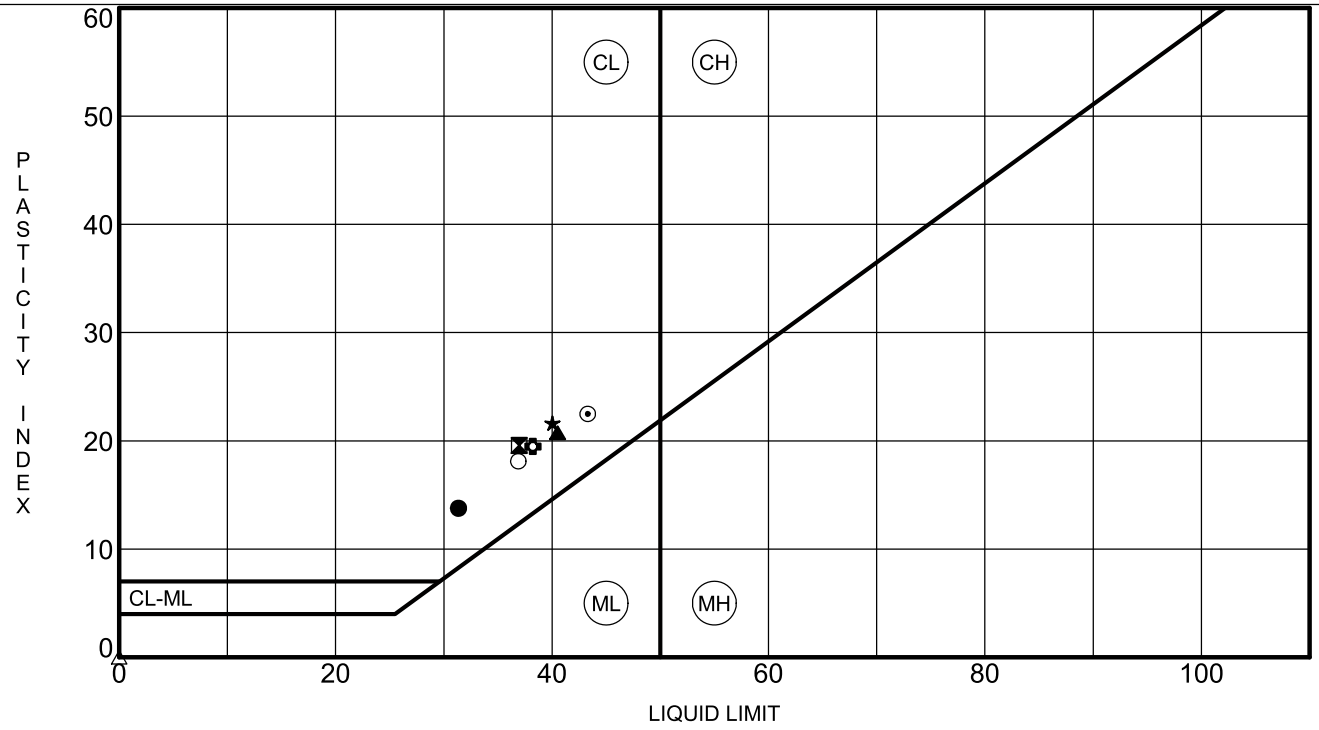
ATTERBERG LIMITS' RESULTS

CLIENT City of Grand Junction **PROJECT NAME** Las Colonias Business Park

PROJECT NUMBER 00208-0077 **PROJECT LOCATION** Grand Junction, CO



	Specimen Identification		LL	PL	PI	#200	Classification
●	**Composite #1**	**1/2018**	**31**	**18**	**13**	**71**	**LEAN CLAY with SAND(CL)**
⧓	**Composite #2**	**1/2018**	**37**	**17**	**20**	**70**	**LEAN CLAY with SAND(CL)**
▲	**Deep 2, SS1**	**1/2018**	**41**	**20**	**21**	**59**	**SANDY LEAN CLAY(CL)**
★	**P-10, SS1**	**1/2018**	**40**	**18**	**22**	**55**	**SANDY LEAN CLAY with GRAVEL(CL)**
⊙	**P-8, SS1**	**1/2018**	**43**	**21**	**22**	**73**	**LEAN CLAY with SAND(CL)**
✿	**PL-1, SS1**	**1/2018**	**38**	**19**	**19**	**61**	**SANDY LEAN CLAY(CL)**
○	**PL-3, SS1**	**1/2018**	**37**	**19**	**18**	**54**	**SANDY LEAN CLAY with GRAVEL(CL)**
△	**PL-5, SS1**	**1/2018**	**NP**	**NP**	**NP**	**50**	**SILTY SAND(SM)**

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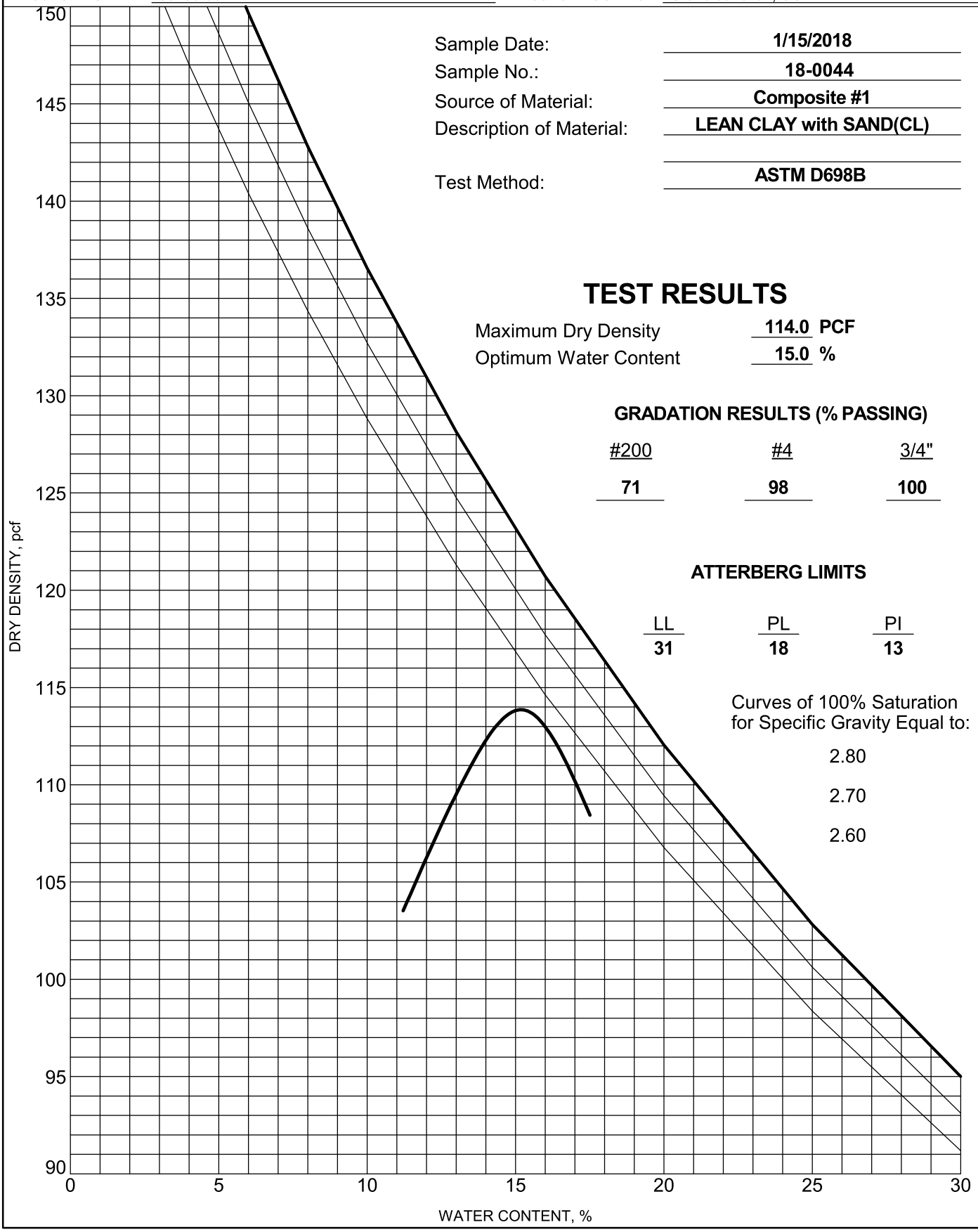
MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Grand Junction
PROJECT NAME Las Colonias Business Park
PROJECT NUMBER 00208-0077
PROJECT LOCATION Grand Junction, CO



Sample Date: **1/15/2018**
Sample No.: **18-0044**
Source of Material: **Composite #1**
Description of Material: **LEAN CLAY with SAND(CL)**
Test Method: **ASTM D698B**

TEST RESULTS

Maximum Dry Density **114.0** PCF
Optimum Water Content **15.0** %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
71	98	100

ATTERBERG LIMITS

LL	PL	PI
31	18	13

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

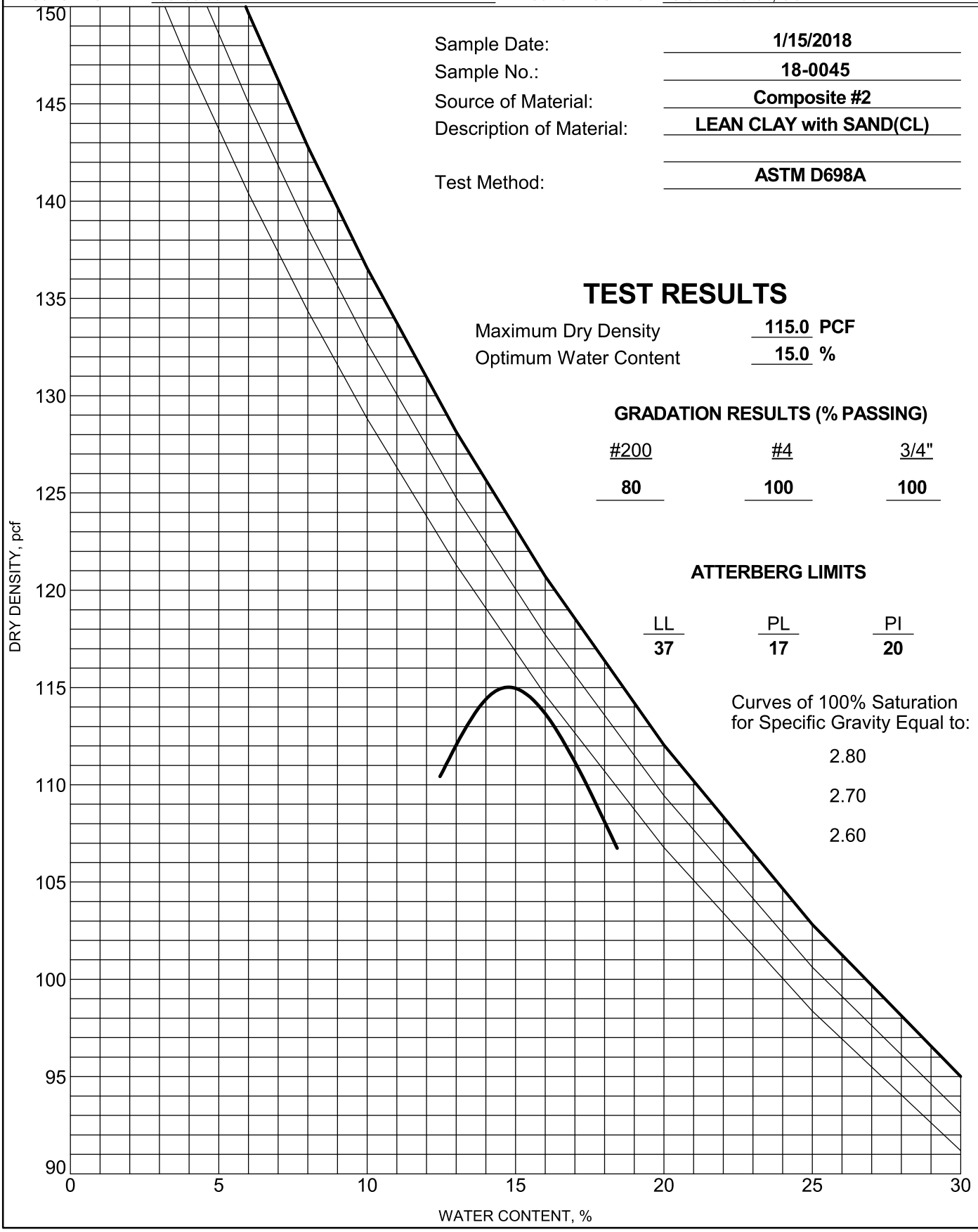
COMPACTION 00208-0077 LAS COLONIAS.GPJ GINT US LAB.GDT 1/25/18

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Grand Junction **PROJECT NAME** Las Colonias Business Park

PROJECT NUMBER 00208-0077 **PROJECT LOCATION** Grand Junction, CO



Sample Date: **1/15/2018**

Sample No.: **18-0045**

Source of Material: **Composite #2**

Description of Material: **LEAN CLAY with SAND(CL)**

Test Method: **ASTM D698A**

TEST RESULTS

Maximum Dry Density **115.0** PCF

Optimum Water Content **15.0** %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
80	100	100

ATTERBERG LIMITS

LL	PL	PI
37	17	20

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

Huddleston-Berry
Engineering & Testing, LLC

CALIFORNIA BEARING RATIO
ASTM D1883

Project No.:	00208-0077		**Authorized By:**	Client	**Date:** 01/15/18
Project Name:	Las Colonias Business Park		**Sampled By:**	CM	**Date:** 01/15/18
Client Name:	City of Grand Junction		**Submitted By:**	CM	**Date:** 01/16/18
Sample Number:	18-044	**Location:** Composite #1	**Reviewed By:**	MAB	**Date:** 01/25/18

Compaction Method ASTM D698, Method B

Maximum Dry Density (pcf): 114.0

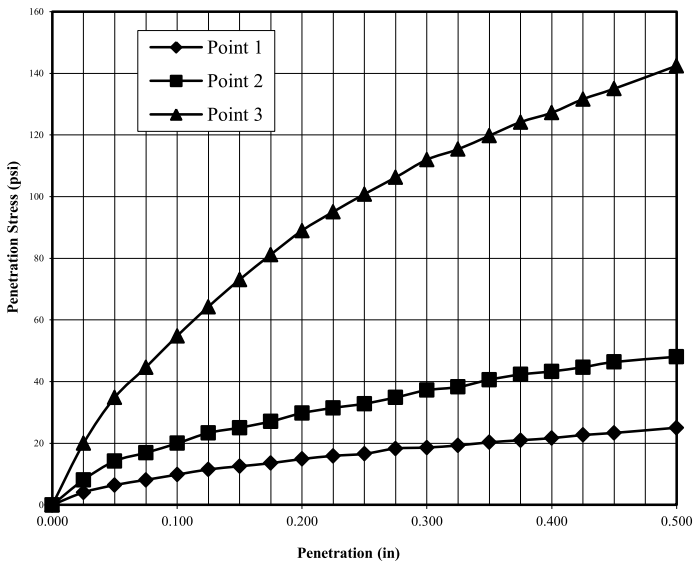
Opt. Moisture Content (%): 15.0

Sample Condition: Soaked

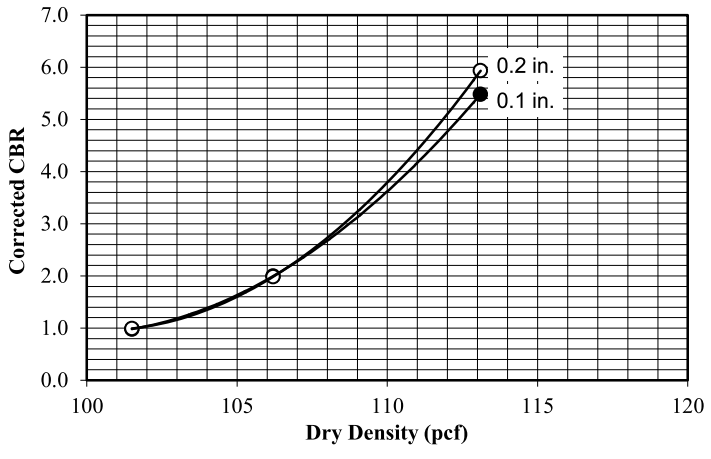
Remarks:

		Sample Data		
		Point 1	Point 2	Point 3
Blows per Compacted Lift:		15	25	56
Surcharge Weight (lbs):		10.0	10.0	10.0
Dry Density Before Soak (pcf):		101.5	106.2	113.1
Dry Density After Soak (pcf):		99.9	104.6	112.2
Moisture Content (%)	Bottom Pre-Test	15.0	15.1	14.6
	Top Pre-Test	15.3	14.7	14.4
	Top 1" After Test	27.3	23.8	20.4
	Average After Soak:	21.4	19.1	17.0
Percent Swell After Soak:		1.6	1.5	0.8

Load Pentration Curve(s)



Dry Density vs CBR

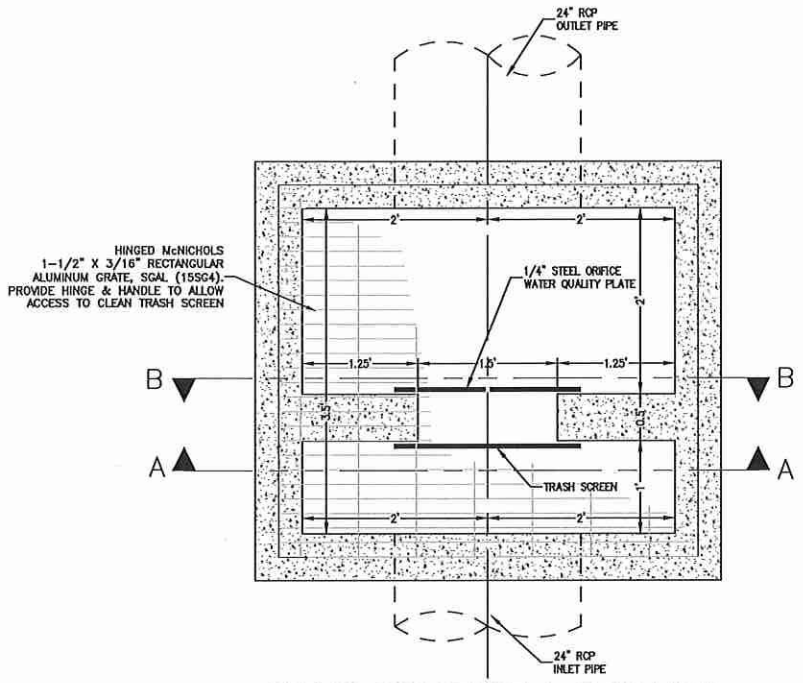


Penetration Data								
Point 1			Point 2			Point 3		
Dist. (in)	Load (lbs)	Stress (psi)	Dist. (in)	Load (lbs)	Stress (psi)	Dist. (in)	Load (lbs)	Stress (psi)
0.000	0	0	0.000	0	0	0.000	0	0
0.025	12	4	0.025	24	8	0.025	59	20
0.050	19	6	0.050	42	14	0.050	103	35
0.075	24	8	0.075	50	17	0.075	132	45
0.100	29	10	0.100	59	20	0.100	162	55
0.125	34	12	0.125	69	23	0.125	190	64
0.150	37	13	0.150	74	25	0.150	216	73
0.175	40	14	0.175	80	27	0.175	240	81
0.200	44	15	0.200	88	30	0.200	263	89
0.225	47	16	0.225	93	31	0.225	281	95
0.250	49	17	0.250	97	33	0.250	298	101
0.275	54	18	0.275	103	35	0.275	314	106
0.300	55	19	0.300	110	37	0.300	331	112
0.325	57	19	0.325	113	38	0.325	341	115
0.350	60	20	0.350	120	41	0.350	354	120
0.375	62	21	0.375	125	42	0.375	367	124
0.400	64	22	0.400	128	43	0.400	376	127
0.425	67	23	0.425	132	45	0.425	389	132
0.450	69	23	0.450	137	46	0.450	399	135
0.500	74	25	0.500	142	48	0.500	421	142

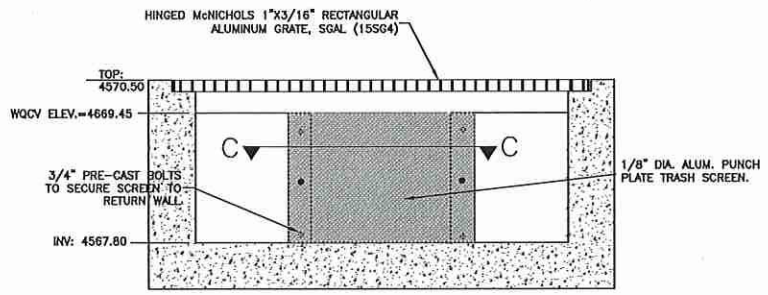
Corrected CBR @ 0.1"		
1.0	2.0	5.5
Corrected CBR @ 0.2"		
1.0	2.0	5.9

Penetration Distance Correction (in)		
0.000	0.000	0.000

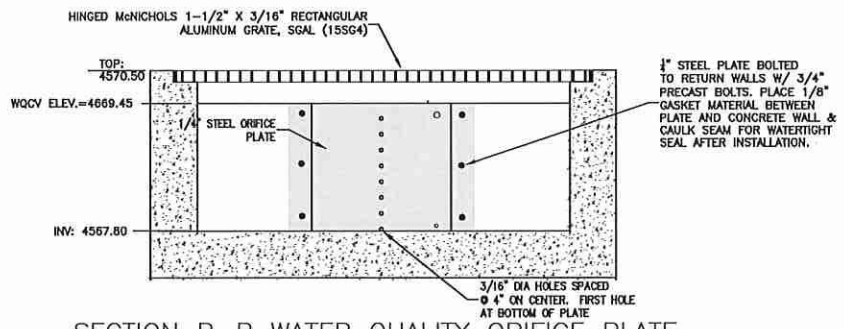
Figure: _____



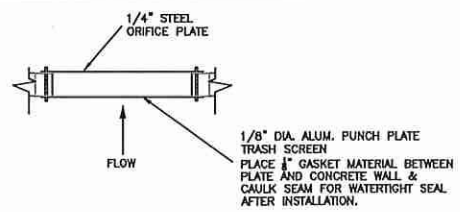
OUTLET STRUCTURE 1 PLAN VIEW



SECTION A–A – TRASH SCREEN



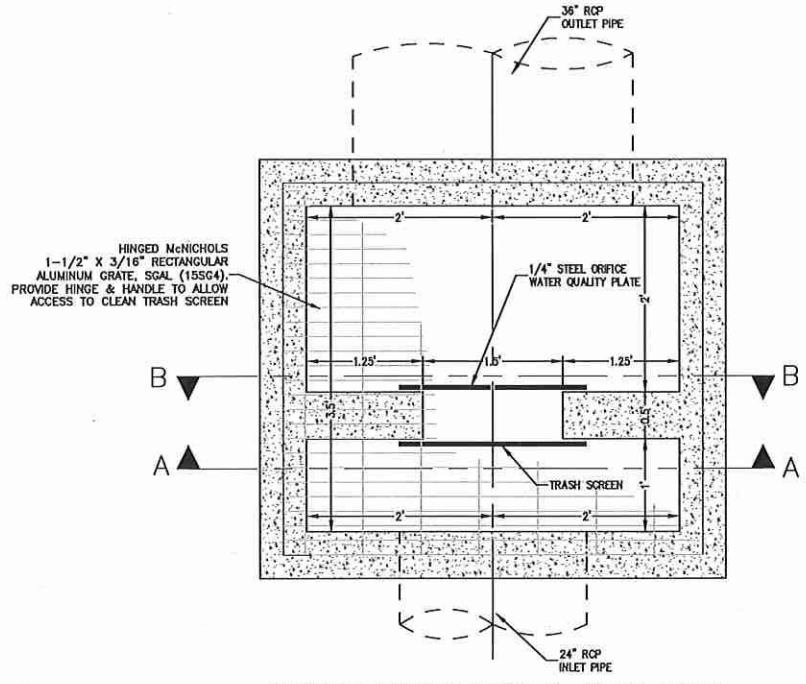
SECTION B–B WATER QUALITY ORIFICE PLATE



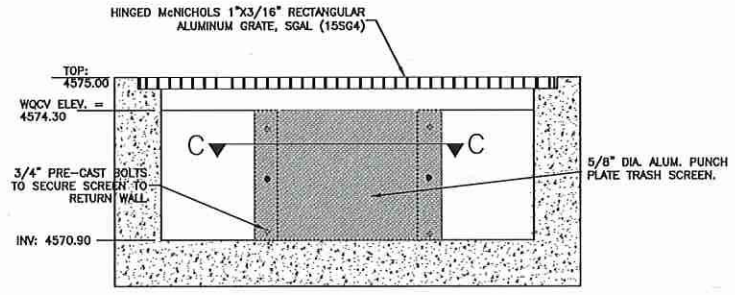
SECTION C–C

WATER QUALITY OUTLET STRUCTURE POND 1

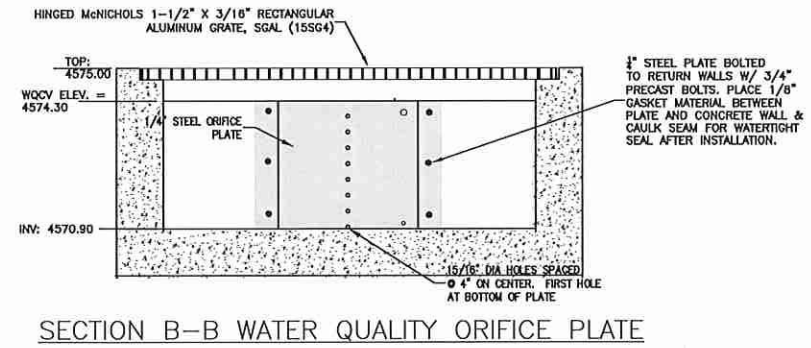
NTS



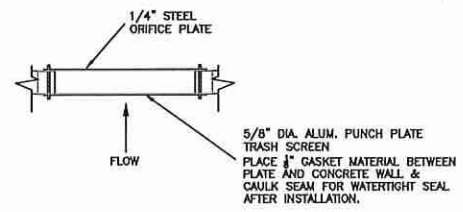
OUTLET STRUCTURE 2 PLAN VIEW



SECTION A–A – TRASH SCREEN



SECTION B–B WATER QUALITY ORIFICE PLATE



SECTION C–C

WATER QUALITY OUTLET STRUCTURE POND 3

NTS

Know what's below. Call before you dig. 811

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

NO.	REVISIONS DESCRIPTION	DATE	BY

A • C • G
AUSTIN CIVIL GROUP, INC.
Land Planning • Civil Engineering • Development Services
123 North 7 Street, Suite 300 • Grand Junction, Colorado 81501
(970) 245-7540

LAS COLONIES BUSINESS PARK

description: WATER QUALITY POND OUTLET STRUCTURES FOR POND 1 & 3

prepared for: City of Grand Junction

DRAWN BY:	DESIGNED BY:	CHECKED BY:	APPROVED BY: MRA

JOB NUMBER: 1024.0007
DATE: 12-29-17
SCALE: NOT TO SCALE
SHEET NO: S-1